

CLAIMS:

1. A method for encoding a random bit stream in two-dimensions for storage on a storage medium, comprising the steps of:

5 encoding (3310) the random bit stream using Variable Aperture Coding (VAC) so as to generate a constant amplitude, varying pulse-width, VAC encoding that represents the random bit stream by a plurality of pulses separated using only transition widths included in a pre-specified set of transition widths.

10 2. The method of claim 1, wherein each of the transition widths in the predetermined set specify a different number of zeros between adjacent ones.

3. The method of claim 2, wherein the transition widths in the pre-specified set consist of one of a first group, a second group, and a third group of transition widths, the first group consisting of three zeros, six zeros, and nine zeros, the second group consisting of five  
15 zeros, six zeros, and seven zeros, and the third group consisting of four zeros, six zeros, and eight zeros.

4. The method of claim 1, further comprising the steps of:  
transmitting (3320) the VAC encoding along a data channel for storage on the storage  
20 medium; and  
transmitting (3325) other VAC encodings along the data channel, within an intra-pulse interval of the VAC encoding, for storage on the storage medium.

5. The method of claim 4, wherein the VAC encoding and the other VAC  
25 encodings are orthogonal with respect to each other.

6. The method of claim 1, further comprising the step of selecting (3305) the transition widths included in the pre-specified set of transition widths based on a capability to reduce at least one of Inter-Symbol Interference (ISI) and Inter-Track Interference (ITI)  
30 during a read operation of the VAC encoding from the storage medium.

7. The method of claim 1, further comprising the step of selecting (3305) the transition widths included in the pre-specified set of transition widths so as to increase a number of bits per transition in a given storage area on the storage medium.

8. The method of claim 1, further comprising the step of selecting (3305) the transition widths included in the pre-specified set of transitions so as to decrease a Bit Error Rate (BER) of the VAC encoding during a peak detection operation performed on the VAC encoding.

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9. A method for storing a random bit-stream on a storage medium, comprising the steps of:

representing (3310) the random bit stream by a constant amplitude, varying pulse-width, VAC encoding having a plurality of pulses that are separated using only transition widths included in a pre-specified set of transition widths; and

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transmitting (3320) the VAC encoding along a data channel for storage on the storage medium.

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10. The method of claim 9, wherein each of the transition widths in the predetermined set specify a different number of zeros between adjacent ones.

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11. The method of claim 10, wherein the transition widths in the pre-specified set consist of one of a first group, a second group, and a third group of transition widths, the first group consisting of three zeros, six zeros, and nine zeros, the second group consisting of five zeros, six zeros, and seven zeros, and the third group consisting of four zeros, six zeros, and eight zeros.

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12. The method of claim 9, further comprising the step transmitting (3325) other VAC encodings along the data channel, within an intra-pulse interval of the VAC encoding, for storage on the storage medium.

13. The method of claim 12, wherein the VAC encoding and the other VAC encodings are orthogonal with respect to each other.

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14. The method of claim 9, further comprising the step of selecting (3305) the transition widths included in the pre-specified set of transition widths based on a capability to

reduce at least one of Inter-Symbol Interference (ISI) and Inter-Track Interference (ITI) during a read operation of the VAC encoding from the storage medium.

15. The method of claim 9, further comprising the step of selecting (3305) the  
5 transition widths included in the pre-specified set of transition widths so as to increase a number of bits per transition in a given storage area on the storage medium.

16. The method of claim 9, further comprising the step of selecting (3305) the  
transition widths included in the pre-specified set of transitions so as to decrease a Bit Error  
10 Rate (BER) of the VAC encoding during a peak detection operation performed on the VAC encoding.